HEALTH PRESERVATION IN WEST AFRICA

J. CHARLES RYAN

TRADE MARK **'TABLOID'** BRAND

MEDICAL OUTFITS

For use in West Africa

Contain pure, active medicaments, in accurate doses. No weighing; no waste; nothing to spill or evaporate. Climate-proof.

As supplied to Stanley, Emin Pasha, etc.

No. 254 'Tabloid' Medicine Chest contains 'Tabloid' and 'Soloid' Brand medicaments, bandages, dressings, instruments, etc. Measurements: $9 \times 6\frac{3}{4} \times 6\frac{1}{4}$ in. In japanned metal.
Price in London, **75/0**

No. 233 'Tabloid' Medicine Case suitable for individual use, contains nineteen bottles and tubes of 'Tabloid' and 'Soloid' medicaments. Measurements: $7\frac{1}{2} \times 3\frac{1}{2} \times 1\frac{3}{4}$ in. In aluminised metal.
Price in London, **15/0**

Contents fitted to meet purchaser's requirements. Prices to correspond.
Outfits and refills obtainable at all Pharmacies and Stores.



Interesting Booklet "Modern Medical Equipments" gratis and post free, Address a postcard—

BURROUGHS WELLCOME & Co.
Snow Hill Buildings
LONDON, E. C.

NEW YORK MONTREAL SYDNEY CAPE TOWN
MILAN SHANGHAI BUENOS AIRES BOMBAY

xx 875

All Rights Reserved

Facing title.

Health Preservation in West Africa

LIBRARY OF THE
PRESENTED
MEDICAL ASSOCIATION

By J. CHARLES RYAN
L.R.C.P.I., L.M., L.R.C.S.I., L.M.
Diplomate in Tropical Medicine, University, Liverpool; late M.O. West African Medical Staff

WITH INTRODUCTION

By Sir RONALD ROSS
K.C.B., F.R.S., Nobel Laureate, M.D., D.P.H., F.R.C.S., D.Sc., LL.D.

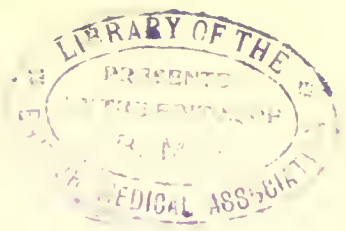
"Semper aliquid novi Africam afferre."—Pliny the Elder



London
JOHN BALE, SONS & DANIELSSON, Ltd.
OXFORD HOUSE
83-91, Great Titchfield Street, Oxford Street, W.
1914
[*All rights reserved*]

14785 788

WELLCOME INSTITUTE LIBRARY
Coll. welMOmec
Call No. WC



INSCRIBED TO

SIR RONALD ROSS, K.C.B., F.R.S., NOBEL LAUREATE,

M.D., D.P.H., F.R.C.S., D.SC., LL.D.,

PROFESSOR OF TROPICAL SANITATION,

UNIVERSITY OF LIVERPOOL,

MEMBER OF THE ADVISORY MEDICAL AND SANITARY

COMMITTEE FOR TROPICAL AFRICA,

COLONIAL OFFICE,

AS A HUMBLE TOKEN OF ESTEEM.

Digitized by the Internet Archive
in 2016

https://archive.org/details/b2806379x

PREFACE.

In venturing to compile these hints my object is to supply as briefly and as simply as possible the essential personal measures to be adopted towards preservation of health by those visiting West Africa. Though, in the main, they apply to West Africa, where the writer has resided in four different Colonies, the subject-matter is in general applicable to tropical Africa.

Two reasons have suggested publishing this little book. Firstly, owing to the fact that the number of white people finding employment in West Africa is yearly on the increase. Practical efforts are now being made to develop the resources of that immense country. Railway and road making are receiving the active support of the Government.

Secondly, owing to the misleading and dangerous statements uttered by some so-called "Old Coasters." The advice they are ever

eager to proffer to newcomers reveals how little they have gained by experience.

West Africa is, and from the nature of things always must be, an unhealthy country for the white race. No one should contemplate life out there without undergoing a medical examination as to his fitness. But a healthy man who makes up his mind to pay detailed attention to preventive measures towards illness in spite of the trouble this may cause him, will be amply rewarded in being able fully to enjoy the liberal conditions his employment affords.

There can be little doubt, however, that some men survive, nay, thrive, who are regardless of care. This fact is frequently referred to by those who decry caution. They quote, *ad nauseam*, isolated examples and, unfortunately, by such means impress the inexperienced with their arguments. This immunity is extremely rare indeed, and only found in individuals who are exceptionally robust and of mature age.

For the average European residing there who neglects to adopt precautionary measures

West Africa is assuredly a deadly country. The watchword should be "Attend to details."

I am indebted to Sir Ronald Ross, F.R.S., K.C.B., Nobel Laureate, Professor of Tropical Sanitation, University of Liverpool; Sir Patrick Manson, F.R.S., K.C.M.G., late Medical Advisor to the Colonial Office, and Robert Newstead, Esq., M.Sc., F.E.S., A.L.S., University, Liverpool, for the great assistance afforded me through consulting their publications and lectures on tropical medicine and entomology.

80, *Rathgar Road*,
Dublin,
July, 1913.

CONTENTS.

PAGE

CHAPTER I 1

Malarial Fever.—Its Consequences, Seriousness, and History—The Mosquito Theory—Sir Ronald Ross's Discovery—The Malarial Parasite—Dr. Laveran's Discovery—How the Infection is transmitted—Blood Destruction resulting therefrom 1

Blackwater Fever.—Connection with Malarial Fever—One of the most Serious Ailments—The Usual History—A Typical Case which reveals the Danger following Neglect of Precautions against Malaria—Tendency to recur—Malarial Saturation the Danger—Exciting Causes ... 4

Yellow Fever.—A very Fatal Disease—Recent Epidemics in British West Africa—Transmitting Mosquito—Proved to be an Infectious Disease only in the Presence of the Transmitting Agent 5

Filariasis.—What due to—Elephantiasis a Result—Transmitting Mosquito—Sir Patrick Manson's Discovery 6

Dysentery.—Far too Common a Disease—Water-borne 6

Diarrhœa.—Causes—Common House-fly in Relation to 6

Ankylostomiasis.—Cause—How transmitted ... 7

Guinea-worm.—A Common Cause of Invalidism in Natives—Carried in Unboiled Water ... 7

Sleeping Sickness.—Not a New Disease—Cause, Europeans only recently attacked—The Cause of its Ravages—Transmitting Agent—Future Dangers—The Sleepy Stage 7

Plague.—Recent Appearance in West Africa for the First Time—Transmitting Agent 9

CHAPTER I—*continued.* PAGE

The Chigger or Sand-flea.—Parts affected—Where found—Not confined to Man—Dogs liable 9

Sun.—Injurious Effects of 10

Prickly Heat.—Connected with Perspiration—New Arrivals suffer most—Erroneous Idea 11

Dhobie's Itch.—What it is—How transmitted—Craw-craw a Different Disease 11

Tinea versicolor.—Associated with Perspiration ... 12

Boils.—May be of Serious Moment—A Doctor should be consulted 12

CHAPTER II 13

PREVENTIVE MEASURES.

Malaria.—The Three Cardinal Rules—Destruction of Mosquito—Destruction of Anopheles in Dwellings—The Avoidance of being bitten by Mosquitoes—Mosquito-proof House—Site for Dwellings—Mosquito Bed Net, Important Points regarding same—Mosquito Boots—Danger of wearing Pyjamas out of Bed—Segregation—Children a Hotbed of Infection—The Flight of the Mosquito—Taking of Quinine—"Quininism"—Methods of Administration—Erroneous Impressions *re* taking Quinine—Method recommended where "Quininism" is Troublesome—Precaution *re* "Tabloids" or Tablets of Quinine—When the taking of Quinine should be commenced—Advantage of Mosquito-proof Quarters in Towns or Villages—Sir Patrick Manson's Experiment—Principles to be observed in building a House or Bungalow ... 13

Blackwater Fever.—Measures similar to those adopted against Malaria 36

Yellow Fever.—Guiding Principles—Characteristics of transmitting Agent—The Destruction of Mosquitoes—How to deal with Breeding-places—Destruction of Stegomyia in Dwellings—Fumigation—The Avoidance of being bitten by Mosquitoes 36

CHAPTER II—*continued.* PAGE

Filariasis.—Breeding-places of Transmitter ... 41

Dysentery.—Disease due to Neglect—Freedom of the Japanese during the Russo-Japanese War—Water in West Africa—Source of Water Supply—How to treat Water—Boiling—Filtering—Danger of using Unboiled Water for washing, cleaning Kitchen Utensils, &c.—Danger of washing Vegetables in Unboiled Water—Proposed System to be adopted—When and how to clean Filter—The Common House-fly a Transmitter of Disease 42

Diarrhœa.—Attention to Water Supply, Precautions *re* Food, Cooking Utensils, and Glass Cloths 49

All other Water-borne Diseases 50

Sleeping Sickness.—The Transmitter—The Characteristics of Tsetse-fly—Danger in Native Centres—Double Purpose of Mosquito-proof House 50

Plague.—Preventive Measures essentially belong to Public Health Bodies—Outbreak of Disease in Rats precedes Epidemic—Personal Precautions during Epidemic 52

Chiggers.—Preventive Measures 53

Sun.—The Hottest Houses in West Africa—Sun Helmet and Sun Umbrella—Spinal Pad—Clothes—Substitution of Waistbelt for Braces condemned—Danger of Constipation—Danger of Alcohol—A Substitute 53

Prickly Heat.—New Arrivals in West Africa most Prone—Thirst in Relation to—Aggravated by Flannel or Woollen Underwear 55

Dhobie's Itch.—Caution *re* washing Clothes—Proposed System 56

Boils.—Due to Various Causes—"Malarial Boils" a Misnomer—Predisposed to by Perspiration—The Importance of consulting a Doctor—Prevention against Local Infection 56

PAGE

CHAPTER III 58

Camp Sanitation.—The Site—The Elevation—Protection from Mosquitoes—The Water Supply—The Clearing of the Compound—The Treatment of the Floors of the Tent, &c.—The Position of Servants' Dwellings—The Position of the Latrine—The Position of the "Night Soil" Pit, and its Uses 58

CHAPTER IV 67

Dietary, Bath, Exercise, and Treatment.—Milk—Tinned Food — Fruit — Vegetables — Fish—Fowl—Wildfowl—Important Point in the Cooking of—Importance of Early Evisceration—Dangers of Decomposition—Antelope, Beef, Mutton, and Goat's Flesh—Eggs—Well-trained Steward and Cook are Health Assets—Inspection of Market Messenger's Purchases Important 67

Alcohol.—Dangers—Avoidance of during the Daytime—Beverages as a Substitute—"Cock-tail" and Dyspepsia 74

The Bath.—The Experienced Coaster's Precaution 75

Exercise.—Cooling after, Danger of 76

Treatment.—"Domestic Doctoring," Danger of—Importance of Early Medical Aid—A Few Hints to those beyond the Reach of a Doctor ... 77

Malarial Fever 78

Blackwater Fever.—No Effort to be spared in securing Medical Aid—Danger of moving Patient—Nourishment in—Recipes 80

Diarrhœa 87

Snake-bite 87

Dhobie's Itch.—Prescription 88

Prickly Heat 89

APPENDIX (Illustrated) 90

INTRODUCTION.

By SIR RONALD ROSS, K.C.B., F.R.S.

Dr. Ryan has paid me the compliment of asking me to write a few words of introduction to his very useful little book on "Health Preservation in West Africa."

The best introduction which I can give is to call the attention of the reader to the remarkable improvement in the health of Europeans there during the last ten years—of which full particulars have recently been published by the Colonial Office, and also by Dr. A. E. Horn, of the West African Medical Staff, in the *Lancet* for May 18, 1912. Old statistics, covering a period of seventeen years from 1881 to 1897 inclusive, showed a death-rate of 75·8 per thousand among European officials in the Gold Coast, and one of 53·6 per

thousand for Lagos. But since then both the death and the invaliding rates have fallen progressively until in 1911 the death-rate was only 13·9 per thousand and the invaliding rate was only 25·2 per thousand, as an average for the whole of the West African Colonies.

Much of the improvement has doubtless been due to public sanitary measures, but much also to the work and the advice of medical men in West Africa, such as Dr. Ryan, who have spared no effort to persuade Europeans there to do their best to *protect themselves* against the ever-present infections which caused such havoc among their predecessors. Whatever may be the public sanitary measures undertaken, the private individual always has it in his power to diminish the chances of such infection in his own case—if only he will take the trouble to follow the instructions which doctors give him. Books like this one therefore fill a most important *rôle* as regards the development of tropical countries, in that they enable everyone to help himself if he chooses

to do so. I should add that Dr. Ryan's book is full of wise hints and of information useful to everyone.

RONALD ROSS,
Professor of Tropical Sanitation, University of Liverpool;
Member of the Advisory Medical and Sanitary Committee for Tropical Africa, Colonial Office.

18, *Cavendish Square,*
London, W.

HEALTH PRESERVATION IN WEST AFRICA.

CHAPTER I.

In this chapter an outline of the more common tropical ailments will be given to assist the reader to understand more clearly the preventive measures dealt with in detail later.

(1) *Malarial fever* is, as is well known, one of the most important of these. Its consequences are so numerous, and may be so serious, that every European about to visit the Tropics should have an intelligent idea of the salient features of this disease, more especially as regards the mode of prevention. A brief reference to its history may be of interest.

Malarial fever was first recognized about 400 B.C. in Greece. It entered Rome before the time of Julius Cæsar. Frequently occurring

in the neighbourhood of swamps and other undrained areas where the effluvia from decomposing strata and vegetable matter permeated the atmosphere, it was ascribed to bad air, hence the name Mal-aria.

About 1200 A.D., Indian writers drew attention to the fact that the prevalence of malaria and the presence of mosquitoes were peculiarly associated. At different periods since then this seeming coincidence has been referred to, therefore, it cannot be asserted that the mosquito theory *per se* is of recent date. It, however, remained a conjecture until the researches of Sir Ronald Ross placed it on a sound basis, culminating in his epoch-marking discovery in 1897. Sir Ronald Ross then conclusively proved that the parasite causing malarial fever was transmitted from one human being to another by means of a particular variety of mosquito (Anopheles).

There is no other known means by which malarial fever can be transmitted from one human being to another than by the female members of the sub-family Anophelinæ.

In 1880 Dr. Laveran, a French physician

residing in Algiers, discovered the actual cause of malarial fever to be a parasite living within the red blood cells. This parasite, at a certain stage of its development, is taken up with the blood of an infected person by the mosquito while this blood-sucking gnat feeds. Inside the body of the fly the parasite undergoes a further process of growth and finally proliferates. The new generation is then ready for transmission, and is subsequently injected into other human beings in large numbers while the mosquito feeds. So greatly does the parasite multiply within the body of the insect, that one mosquito is capable of infecting several persons, *i.e.*, injecting parasites each time she feeds, during many meals. As the parasite increases enormously in number within the human body, devouring the essential constituent of the red blood cells and manufacturing a poison which increases blood destruction, the resulting anæmia—poverty of blood—becomes very evident, especially after repeated attacks of fever, when it is liable to be associated with a train of distressing symptoms of mental and bodily enfeeblement.

(2) *Blackwater fever* is believed to be closely related to malarial fever. This opinion is shared by practitioners in West Africa, where the disease so frequently occurs, and is one of the most serious ailments affecting Europeans resident there. The usual history ascertained regarding a patient suffering from it is that he has had repeated doses of malaria.

The following may be cited as a typical case. A man arrives in West Africa for the first time; *he does not take quinine regularly as a preventive against malaria* and fails to pay the necessary attention to other precautionary measures; consequently in or about a month he develops malaria, for which he undergoes treatment, and has quite recovered within a period of ten or twelve days. Repeated occurrence takes place, so that at the end of his first year's sojourn in the country he may have had six, eight, or more attacks of malarial fever, some perhaps so slight as to confine him to the house for only four or five days. By this time his system is becoming saturated with malaria, and herein is the danger. He now returns to England on leave. During

the three or four months he spends at home he may have one or more relapses. On his return to West Africa he resumes his former mode of living, getting what is now considered his usual monthly attack of malaria. The fourth attack develops into blackwater fever.

The above may be, as already stated, taken as a typical case. But a great variety of conditions exists as to when blackwater fever occurs. Once developed it has a tendency to recur.

The important point to note is that it is especially liable to occur when the system is saturated with malaria, in which case its onset is excited by anything that reduces the already lowered vitality of the individual, such as a shock resulting from injury, a chill consequent upon a wetting or sitting to cool in a draught after exercise. Fatigue or alcoholism may also be an exciting cause.

(3) *Yellow Fever.*—This disease, so fatal to Europeans, was almost unknown in British West Africa until recently, when epidemics broke out. It was, however, quickly recognized and checked by the vigorous measures adopted by Government. It is one of the

diseases transmitted directly by a mosquito (*Stegomyia fasciata*). It should be clearly understood that, as in malarial fever, yellow fever is an infectious disease only in the presence of the transmitting agent. It has been proved by practical experiment that it can only be carried from one individual to another by this mosquito, and that in the absence of the insect the healthy and the sick can intermingle with impunity.

(4) *Filariasis* is a disease due to the presence of a very slender worm (filaria) in the blood and lymph-vessels. One of its consequences is the well-known disease, elephantiasis.

Filariasis is another of the diseases transmitted from man to man by a mosquito (*Culex fatigans*), as demonstrated by the brilliant researches made by Sir Patrick Manson so far back as 1877.

(5) *Dysentery* is far too common an ailment amongst Europeans in West Africa. Its immediate and remote consequences compel it to be classed with the most dangerous of tropical ailments. *It is a water-borne disease.*

(6) *Diarrhœa.*—This is frequently due to

unsound tinned fruit, and other preserved foods. It is also associated with the contamination of fresh food by ordinary house flies who have previously fed on filth. Impure water is another cause. It is a very common and weakening affection.

(7) *Ankylostomiasis* is a disease associated with progressive anæmia and great debility. It is due to a minute worm which attacks portions of the intestine, and is transmitted by infected persons through fæcal contamination of earth and water.

(8) *Guinea-worm* is one of the commonest causes of invalidism in West African natives, particularly in Southern Nigeria and on the Gold Coast ; fortunately it is very rarely found in European residents. Guinea-worm is a water-borne parasite. The natives never *boil their drinking water* and when drinking swallow the parasite, which eventually appears under the skin, most frequently in the lower part of the leg, and causes, either through neglect or improper treatment, very severe inflammation and ulceration.

(9) *Sleeping sickness* is so much discussed

at the present time that many people are under the impression that it is quite a new disease. It has existed for at least one hundred years and is confined to Equatorial Africa. It is due to the presence of a minute spiral-shaped animal (trypanosome) in the blood and glands of the sufferer. It is only during recent years that it has been known to have attacked European residents. It has decimated the native population in different parts of East Africa. In West Africa it is especially prevalent amongst Congo natives. The ravages it has made within the last decade are due to the improved facilities of communication.

By means of railways, &c., the infected and non-infected are brought together in a manner impossible heretofore. The tsetse-fly, which is the transmitting agent, is thus afforded ample opportunities of propagating its mission of evil.

The disease is certain to make steady headway as Equatorial Africa undergoes development, unless the different European nations controlling that vast area unite to grapple energetically with it. The sleepy stage only occurs late in the illness.

(10) *Plague* has recently appeared in West Africa, seemingly for the first time. The outbreak was overcome in a comparatively short period owing to the vigorous measures adopted by the officers of the West African Medical Staff, thanks to whom not a single European became affected. Rats are very prone to develop the disease, which is then transmitted by the rat-flea to man.

(11) *The Chigger or Sand-flea.*—This pest flourishes throughout West Africa. Owing to its minute size it is difficult to discern with the naked eye and usually remains undetected until it has set up the pain and inflammation it causes. It most frequently attacks the feet, boring holes in the soles, and between and in the toes. It is found in sandy soil and is very commonly present in the floors of "barries," especially when these are insufficiently beaten and hardened or allowed to become dirty and neglected. Its attentions are not confined to man.

The writer has had his dog made very lame in consequence, and would recommend anyone bringing out a dog to West Africa to have the

animal's paws well washed with a solution of Izal disinfectant fluid (1 teaspoonful to 2 pints of warm water) two or three times a week, while stationed wherever chiggers are known to be present, a fact which he can easily ascertain from his servants. The Izal solution should be rinsed off with water, otherwise the animal may be sickened through licking it off.

(12) *Sun.*—The injurious effect of the sun should always be borne in mind. Apart from the more serious consequences of sunstroke and heat exhaustion resulting from undue exposure to the sun's rays or to a high temperature in the shade, there occurs a fatiguing influence which lowers the natural resisting powers of the body and thus predisposes to the development of a definite disease such as malaria, as well as to the minor ailments of dyspepsia, headache, and so forth.

As is well known, a very hot, dry climate is less enervating than a moderately high temperature associated with a moist atmosphere as exists in West Africa, where the average maximum shade temperature is about 90° F.

Affections of the Skin.

(13) *Prickly heat* is associated with excessive perspiration and causes much discomfort. It gives rise to a rash consisting of minute red points, sometimes in patches or else generally distributed over the body, and accompanied by a pricking sensation. New arrivals suffer the most. After the third year of residence one becomes less susceptible.

A popular, but very erroneous, idea exists that he who gets prickly heat will not contract malaria.

(14) *Dhobie's itch* or *Washerman's itch* is a severe form of ringworm, giving rise to intense irritation, sleeplessness, and great discomfort. It most frequently attacks the crutch and armpit, and unless energetically treated spreads rapidly. It is extremely contagious; the infecting micro-organism is supposed to be water borne.

The spread of the disease is probably explained by the fact that the West African laundress washes collections of clothes indiscriminately *in unboiled* water, so that the infection can be easily transmitted from

garment to garment by means of the contaminated water.

Craw-craw is confused with Dhobie's itch. Europeans when suffering from the latter almost invariably refer to it as Craw-craw. Dhobie's itch is a red ring-like patch with a slightly raised margin. Craw-craw is a pustular eruption, and rarely affects Europeans, whereas they frequently suffer from Dhobie's itch.

(15) *Tinea versicolor.*—A yellow or light copper discoloration occasionally develops on the back and front of the chest of Europeans in the Tropics, and may cover the greater part of each area. It is associated with excessive perspiration, and is of no importance from a health point of view. Should it invade exposed parts, it ought to be treated for appearance sake.

(16) *Boils* of more or less severity are a common trouble to Europeans in West Africa. They are often consequent upon debility, but may be an evidence of some serious constitutional malady, therefore a doctor should be consulted without delay when within reach.

CHAPTER II.

Preventive Measures.

(1) Malaria.

There are three cardinal rules for the prevention of malaria :—

(*a*) The destruction of mosquitoes.

(*b*) The avoidance of being bitten by mosquitoes.

(*c*) The taking of quinine.

Theoretically either (*a*) or (*b*) should be sufficient; as regards (*a*) from a practical point of view it would be utterly impossible to annihilate mosquitoes, and concerning (*b*) the conditions under which most Europeans work in West Africa, and the accommodation afforded them would render most unsafe their pinning their faith upon avoiding being bitten. Finally, quinine taken in the relatively small doses to be mentioned later could not alone be an absolute preventive, but combined with the other two becomes a most potent factor. A

combination of the three then is essential. Each one will now be dealt with.

(*a*) *Destruction of mosquitoes* really means their destruction in the immature state, *i.e.*, eggs, larvæ, and pupæ, and also of their breeding ground. To confine one's efforts to dealing with the mature insect found lurking within the house would be futile; their source of origin must also be attacked. To know the breeding places is therefore of vital importance. Since the different genera of mosquitoes vary more or less in their choice of egg-laying areas those places selected by the genus *Anopheles* — the transmitter of malaria — will alone be dealt with here. The favourite breeding places are :—

(1) Shallow waters in which grow sedges and weeds as found in swamps and ditches, lodgments due to the overflow of streams and rivers, also on the edges of lakes and the sources of natural springs. The sedges retard the flow, should a stream exist; they also afford shelter : two essentials for the development of eggs.

(2) Less often resorted to are rain-water tanks.

(3) The most common of West African Anophelinæ (*Anopheles costalis*), however, breeds in pools, puddles and pits—an important fact to remember.

The tributaries flowing from swamps and shallow springs may carry larvæ a considerable distance from where they were hatched; should their new environment afford opportunity they will there reach maturity, and puzzle an observer by their unexpected presence, unless he is aware of this means of transit.

Breeding grounds can be dealt with in a number of different ways. The choice of means is governed by circumstances. Some measures are only applicable to public or municipal bodies, and as we are concerned with personal prophylaxis the more elaborate scheme would be beyond the purpose of this handbook. A general reference, however, to various means will assist us in arriving at a clear conclusion as to those most suitable for our purpose.

(i) Drainage and reclamation of swamps and other large water-logged areas is a most

effective measure. It is one of the means that should be specially studied by municipal bodies and will not be considered here beyond mentioning that burrow-pits and depressions resulting from railway and road construction should certainly be provided with thorough drainage or else completely filled in.

(ii) Natural hollows or pits which from their situation or the condition of the soil render drainage or filling in impossible should be deepened and kept completely cleared of weeds and grass, since, as has been already mentioned, shallow, sheltered waters are those resorted to. In addition they may be treated with oil (see paragraph iv.).

(iii) Small pools and puddles can be scooped out or swept out, when any larvæ they may contain will be deprived of moisture, should the surrounding ground be porus, and die immediately. The holes should afterwards be completely filled up with fine gravel well pounded in so that it cannot be washed out by rain. This is a very important and very personal measure; stagnant water within a compound is always a danger.

(iv) The oiling of larger pools is a most effective measure if carefully done. Larvæ come to the surface of the water for the purpose of breathing and maintain their position on the surface by means of the water tension ; when oil is poured on the water it destroys this tension and also cuts off the air, when the larvæ must die. Before commencing the oiling process, all weeds and sedges must be thoroughly cleared away, as these would prevent the oil spreading, and this must completely cover the surface of the water. Kerosene is the best kind of oil to use, as owing to its lightness it spreads quickly. The quantity required must be found out by experiment ; about 1 pint to 100 sq. ft. is usually sufficient, and should be repeated twice or thrice weekly, or as often as is necessary. The more exposed to the sun the pool is, the quicker the oil will disappear. It is advisable to revisit the area, some time after each oiling, to ascertain if the larvæ are dead.

(v) Fish devour larvæ and can be put into pools with this object, but to facilitate their attack all weeds must be at regular intervals completely removed.

Destruction of Anopheles in Dwellings.—The fully developed insects are found, during the daytime, resting in sheltered corners of rooms, barries, and tents, also on the outside of the bed-net and on dark-coloured wearing apparel not in use. They should be sought for in these situations and killed with a duster or towel. Anopheles are never found in European quarters in West Africa in such numbers as to necessitate fumigation, but should occasion call for this mode of destruction it ought to be carried out as recommended in the section on yellow fever.

The following explanation will illustrate how mosquitoes, without carrying infection into a house, may, while there, become a danger, and will serve as an additional reason why a vigorous search should be made for them inside a house, tent, or camp.

Assume that an anopheles found living in your room has never fed on an infected person and that you happen to become infected elsewhere and develop malaria. If now this anopheles living in your room feeds upon you she will, in due course, become infective

and, while partaking of subsequent meals, reinfect you from your own blood so to speak; and whoever happens to be living with you runs the risk of being infected through the same medium; therefore, in the presence of the mosquito you become a danger both to yourself and to your neighbour. This matter is so self-evident that reference to it seems almost superfluous. Yet the fact is frequently overlooked.

(*b*) *The Avoidance of being bitten by Mosquitoes.*—Here, too, as with rule (*a*), we have various means at our disposal, and again our choice must be governed by circumstances. The different measures will be referred to in like manner.

(1) *A mosquito-proof house* is a house having all its doors, windows, ventilating spaces, also that portion of the verandah reserved for sitting on, and every crack and crevice completely lined with the fine wire gauze made for the purpose. Unless this is most thoroughly done the house becomes a danger rather than a protection, in that it creates a sense of false security. If there is

any possible chance of entrance the mosquito will discover it; even if only one gets into a room it may be an infecting anopheles and your efforts at protection are defeated. The doors should have spring hinges in order that they may never be opened except when necessary. Mosquito wire gauze is made of different metals. Whatever metal is chosen, nails of the same should be used, to avoid corrosive action.

(2) *Site for Dwellings.*—A camp or bungalow should be at least half a mile distant from and on the windward side of a native compound, a swamp, or other large breeding place (in West Africa the prevailing wind is south-west from April to November. and north-east from December to March). It should be on elevated ground whenever possible. The surroundings should be thoroughly cleared of undergrowth, weeds, grass, &c., for 200 sq. yd., and all holes and depressions within the space filled up with fine gravel. U-shaped drains, as recommended by Sir Ronald Ross, should be made around the dwelling to carry away any rain water, and

lined with cement if possible, as otherwise they will be washed out by the tropical rains and need constant repair. Such drains should be directed into a neighbouring river or stream. The houses in towns should have their surroundings kept similarly in order; here, of course, one's attention is confined to a very much smaller area; the drains should be connected with those of the street.

(3) *The mosquito bed-net* is so well known that any reference beyond merely mentioning it seems almost unnecessary; however, there are points of vital importance to be attended to, neglect of which renders it worse than useless.

(i) It should be white. Green and other dark colours should be entirely discarded. The dark body of the mosquito can be readily detected resting inside the net on the white ground, whereas on the dark ones it may escape a careful search many times repeated; furthermore, dark colours attract mosquitoes. Vendors of this article recommend the green shade for its soothing effect on the eyes in the presence of tropical light, a point of minor

importance and of no moment compared with the risk from the mosquito.

(ii) It should be of large size, as warping takes place in the Tropics.

(iii) It should have a linen or calico border 20 in. deep and laden with shot. The border is a protection to the hands, which are so liable to lie touching the net during sleep, and be bitten by mosquitoes hovering around the bed. A border of muslin is useless, the mosquito can easily get her biting apparatus through this. The shot facilitates tucking the ends under the mattress.

(iv) The net ought to be suspended inside the poles of the frame and should never be allowed to hang down by the sides of the bed or on the ground, as a favourite resting-place for mosquitoes is underneath the bed.

(v) Owing to the delicate texture of the net its meshes are very liable to become frayed; daily search should be made for this defect and, if found, the part should be twisted up between the fingers and tied with thread, or else a patch of new netting must be sewn over it. An imperfect net is a positive danger.

(vi) As most mosquitoes become active after sunset, the house-steward should be taught to prepare the bed not later than 4 p.m., to tuck the mosquito net carefully under the mattress, leaving one end sufficiently loose to allow his body to pass underneath the net. He then gets through this loophole armed with a towel or feather duster and gently sweeps the inside of the net in every direction in order to destroy any mosquitoes that may be there; force need not be used, as they are very easily killed. Having done this he quickly withdraws his body, tucks in the loose end and finally makes an inspection around the bed to assure himself no entrance for mosquitoes is left open.

The writer made a rule of fining the boy responsible one penny for each mosquito found inside the net after the bed had been made; the plan worked admirably.

It is worthy of note that some West African anophelines bite during the daytime, especially in the dark corners of bush camps.

(4) *Mosquito boots* are a convenient and useful prevention, as the ankles and lower parts of the legs are especially liable to be

attacked. They are, however, useless if the rest of the body is exposed, as is the case when the pernicious habit of wearing pyjamas out of bed is adopted. This custom is quite a common one in bush stations. The light texture of these garments affords no protection whatever from the proboscis of the mosquito.

Segregation.

This is *par excellence* the preventive measure. In West Africa, where its adoption ought to be given pre-eminent attention, one only finds that spasmodic and wholly unsatisfactory attempts have been made to do so.

Excepting at Sierra Leone there has been no real effort made to put it into practice. Here the Government within recent years spared neither trouble nor expense in placing the officials' residences some miles away from the native town. The outlay has been amply repaid by the improved health of the Staff.

Commercial houses and offices must, of course, be situated in the business centres, but provision ought to be made for placing at least the sleeping accommodation of the Euro-

peans engaged therein outside the native vicinity.

A perplexing difficulty arises in selecting sites for the dwellings of domestic servants. If they are situated beyond earshot you are almost certain to be caused inconvenience, worry, and ill-temper. However, this and other obstacles, may be overcome by focusing individual attention and interest upon them, and this chapter will conclude with a summary of practical points.

The principle of segregation so far as malaria is concerned is based upon the fact that wherever native men and women are congregated there you will find children of all ages. It has been proved by the researches of the late Professor Koch and others that 100 per cent. of these children up to the age of 1 year are infected with malaria, and that from this point the percentage is in inverse ratio to the age. Children therefore are a hotbed of infection, especially the very young, and only require the transmitting mosquito, which is always to be found. It is to be hoped that the vital importance of avoiding the building

of European quarters in close proximity with those of natives can now be thoroughly appreciated.

The flight of the mosquito is supposed to be limited to about half a mile; the distance would seem, however, to be governed by circumstances, and there is strong evidence in support of the assumption that mosquitoes make a longer journey than this in short stages, so to speak, through undergrowth and grass. They are feeble fliers and therefore dislike wind.

If reference is made to section (2) under rule (*b*), page 20, the reason for the points there specified concerning the relation of dwellings to swamps will now be understood, and are equally applicable to the relation of European quarters with the houses of natives.

(*c*) *The Taking of Quinine.*—This measure, as already mentioned, is of great importance when in combination with (*a*) and (*b*). Even those who neglect other preventives, but who take their dose of quinine regularly, usually escape with modified attacks of malarial fever.

Some individuals, relatively few, really suffer various unpleasant effects called "quininism" such as fulness in the head, ringing in the ears with perhaps slight deafness, headache and slight hand tremors. Many think they do, and eagerly ascribe the effects of excessive smoking or other forms of indiscretion to those of the drug. He who is susceptible to "quininism" suffers from a real misfortune. This chink in his armour exposes him to a danger which otherwise might be easily warded off. Indeed so important is the taking of quinine as a preventive of malaria in West Africa that it is questionable whether Europeans who cannot take it should be allowed to remain in that country.

The methods of administration are two, viz. :—

The continuous and the intermittent, *i.e.*, 5 gr. daily or 15 gr. every seven days for two days in succession, viz., 15 gr. every seventh and eighth day.

The continuous method of 5 gr. per day is here strongly recommended for the following reasons :—

(1) If a tendency towards "quininism" exists the larger dose on successive days is more likely to cause it.

(2) As regularity is of prime importance the daily dose soon becomes a habit and is consequently less liable to be forgotten.

(3) It has been proved that the elimination of quinine commences very shortly after it has been absorbed, hence the daily renewal maintains a high standard of resisting power in the system.

Two popular but very erroneous impressions exist on this subject of quinine. One is that taking it habitually reduces its effect, so that should malarial fever be developed enormous doses of the drug would be required to combat the disease. On this point it may be mentioned that the treatment of malarial fever altogether depends upon the severity of the attack, the variety of parasite causing it, and the physical condition of the sufferer. It should be always under the absolute control of a doctor who alone is able to discern what is best for his patient. The second of these ideas is that the habitual taking of quinine causes sexual enfeeblement.

Both these statements are wholly devoid of foundation and the reader's attention is drawn to this fact, fearing that, on being told them (as is sure to happen) he might be tempted to give credence to the fables and thereby be deterred from adopting a valuable protection against illness. Quinine should be taken at a stated hour each day, and to ensure this one of the following rules should be adhered to :—

(i) First thing in the morning fasting, when it will be rapidly absorbed from the empty stomach ; an hour should elapse between the taking of it and the early cup of tea, unless this is *extremely weak*, as *strong tea* reduces the solubility of quinine and consequently its efficacy.

(ii) At lunch hour.

(iii) In the evening after bath with one's beverage of whisky and water (quinine is readily soluble in alcohol).

The writer recommended rule (iii) with beneficial effect in one instance where "quininism" was troublesome. "Tabloids" or tablets of quinine are of the greatest convenience in the

Tropics, as one can always know the exact quantity he is taking.

To make certain however that the drug will be absorbed, and to hasten this process, it is a wise plan to dissolve "Tabloids" in a little water before swallowing them, or else break a "Tabloid" into four pieces, throw these quickly on the tongue and wash them down with some liquid. It is important to treat "Tabloids" or tablets of quinine in either of these ways as the effect of the tropical climate retards their solubility. Sugar-coated "Tabloids" or tablets though pleasant to the taste should be avoided for the same reason. The bihydrochloride of quinine is recommended as being the most soluble salt. The taking of quinine should be begun by those making their first tour, one week before they land at their port of destinaion.

Progress on the road to health in West Africa is beset with difficulties, many of which, however, could be overcome were the subject given the consideration it deserves. If all the points mentioned be earnestly studied and form our goal much will be accomplished in spite of shortcomings.

When Europeans are forced, for purposes of trade or for some other reason, to live close to, or in, native towns or villages, they should certainly be provided with quarters thoroughly mosquito-proof, *i.e.*, the bed, sitting and dining rooms, as well as the verandah, of the dwelling should be thus protected.

The classical experiment instituted by Sir Patrick Manson proved conclusively the value of the mosquito-proof house, and is here quoted from his book on tropical diseases :—

" Doctors Sambon and Low, Sr. Terzi, their servants and visitors, lived for the three most malarial months of 1900 in one of the most malarial localities of the Roman Campagna—Ostia—in a hut from which mosquitoes were excluded by a simple arrangement of wire gauze on the doors and windows. They moved freely about in the neighbourhood during the day, exposed themselves in all weathers, drank the water of the place, often did hard manual work, and beyond retiring from sunset to sunrise to their mosquito-protected hut took no precautions whatever against malaria. They took no quinine. Although their neighbours

the Italian peasants, were each and all of them attacked with malaria, the dwellers in the mosquito-proof hut enjoyed an absolute immunity from the disease."

Under the existing arrangements, this vital measure is ignored in West Africa. It is to be hoped that the efforts to impress the importance of it may not be in vain, and that with the development of the country and the establishment of new centres, attentive interest will make amends in the future for the past and the present indifference.

We will now suppose that the construction of a house or bungalow for European habitation is about to be undertaken, and apply the foregoing principles to practice as a further explanation of their efficacy, and also with the object of affording guidance.

Attention should be paid to :—

(i) The site should be on the windward side of, and not less than half a mile distant from, native habitation, from a river, from swamps, and shallow springs, or the streamlets flowing from these and from any other mosquito-breeding areas.

(ii) The structure should be on rising ground in order to gain the benefit of the breeze which tends to keep away mosquitoes and to cool the air.

(iii) The house should be made thoroughly mosquito-proof. The rain-water tanks connected with the roof should be according to the design devised by Dr. H. Strachan, C.M.G., late P.M.O., Southern Nigeria, and now generally adopted in the Government quarters of that colony. They are so constructed that mosquitoes cannot get into them. Through an ingenious arrangement, when rain falls, the first washings from the roof, containing dirt of various kinds, do not flow into the tank, but are carried outside it by a pipe leading to the ground, having a metal plug at the lower end. This plug should be temporarily removed when rain is about to fall. Should the building be a bungalow, creosote must be poured into the saucer-shaped depressions on the tops of the supporting iron pillars, to prevent these from becoming breeding-places in the rainy season. The creosote should be renewed when necessary. The gutters of the roof

should be kept free from dead leaves and dirt by periodical sweeping. The mosquito-proof arrangements of the house should be carefully examined, and unless these are in the true sense thoroughly reliable, a mosquito bed-net must be used during sleep. The importance of this cannot be over-estimated.

(iv) The ground should be cleared and drained in the manner already discussed, depressions and pits should be treated in one or more of the various ways mentioned. A gang of labourers should be constantly employed to keep the ground clean by sweeping up and burning collections of weeds and other rubbish. A covered barrel about 3 ft. or 4 ft. deep or other covered cylindrical vessel should be conveniently placed to receive offal from the kitchen and other *débris*. The contents should be burned each day leeward of the dwelling.

(v) Servants' dwellings should be placed on the leeward side of the European quarters, and as far away from these as possible, 200 or more yards distant if practicable, and unless the European dwelling be mosquito-proof,

native children should be forbidden residence in its neighbourhood.

(vi) The latrine should also be leeward of the European dwelling and not too close to this. A supply of dry earth or wood-ashes in a box together with a scoop should always be beside the pail. The most suitable pail is a metal vessel with an enamelled inner surface and about 2 ft. deep, wider at the top than at the bottom. It must have a close-fitting metal cover. Each time the pail is used, the contents should be completely covered with earth or ashes; if not, flies will feed on the excreta, and afterwards find their way to where food is stored and contaminate it. One of the disinfecting powders or liquids manufactured for use in closets would also be an advantage. As a further precaution against this danger, the latrine should be leeward of, and at least 200 yds. distant from, the kitchen. Unless sanitation be under the control of the municipal authorities, arrangements should be made to have the pail emptied not less frequently than once each day, into the "night soil" pit. Under Camp Sanitation this subject will be further dealt with.

(2) Blackwater Fever.

Attention has been already drawn to the fact that this disease follows in the wake of malaria. It is therefore self-evident that the measures to be adopted against malaria apply equally to blackwater fever.

Briefly repeated they are :—

(*a*) Protection against the mosquito by every means circumstances will permit.

(*b*) Living, especially sleeping, as far away from native habitations as possible.

(*c*) Taking 5 gr. of quinine daily.

These will very materially reduce the chances of a malarial attack, and the warding off of malaria means the avoidance of blackwater fever.

(3) Yellow Fever.

In considering the measures to be adopted against this disease, we have only to repeat the first two guiding principles in the preceding section, viz. :—

(*a*) The destruction of mosquitoes.

(*b*) The avoidance of being bitten by mosquitoes.

Unfortunately the third is wanting, as there is no specific drug, so far as is at present known, that will assist us in attaining our object.

We have already learned that yellow fever is transmitted not by anopheles but by another and very different genus of mosquito, namely *Stegomyia fasciata*, sometimes referred to as the "brindled" mosquito owing to the characteristic black and white band-like markings on its body.

The transmitting mosquito is widely distributed throughout the tropical world and is very liable, in consequence of its habits, to be carried on board ships from infected to non-infected ports. Therefore preventive measures demand our careful attention.

(*a*) *Destruction of Mosquitoes.*

As with anophelinæ, so with stegomyiæ, destruction essentially implies destruction of the breeding-grounds, which will now be dealt with.

Breeding-places. — Stegomyiæ have little selective influence, and lay their eggs wherever

stagnant water is found, particularly in sardine and other old discarded tins, broken bottles, flower-pots, earthenware cooling pots, roof gutters, calabashes, machinery, tubs, buckets, cisterns, drains, pools, &c.; hence they thrive in a dirty ill-kept compound, which explains why yellow fever primarily develops in, and is so frequently confined to coast towns and other low-lying inhabited areas near big waterways, and also why the disease flourishes in the most filthy parts of these.

How to deal with Breeding-places.—(1) All old discarded tins and bottles should be regularly buried in pits.

(2) Domestic utensils used for holding water should have their contents renewed each day.

(3) Machines that are exposed to the elements should have their hollow parts searched daily for stagnant water; these should be either emptied or regularly oiled.

(4) Cisterns and tanks should be made mosquito-proof with wire gauze.

(5) Drains and pools should be treated as already recommended.

The eggs of stegomyia are protected by a comparatively thick shell which enables them to resist drought for a considerable period.

The larvæ of stegomyia are killed in the same manner as the larvæ of anopheles.

(1) *Destruction of Stegomyiæ in Dwellings.*—The mature insects rest in the folds of dark-coloured curtains, on dark wearing apparel, and in the corners of rooms, barries or tents, where they should be sought for and killed with a towel or duster.

(2) *Fumigation.*—Should a case of yellow fever develop, the house occupied by the patient must have each room fumigated in order to kill all stegomyiæ. This must be carefully done or it will be useless. The room should be hermetically sealed, *i.e.*, every keyhole, crack and crevice being covered with paper pasted over it. The size of the room must be gauged in order to calculate the amount of the fumigating substance that will be required. Of course when the patient's room comes to be treated the patient will have to be transferred.

(i) *Sulphur candles* are a convenient means;

2 lb. for every 1,000 cubic ft. will be necessary. As sulphur is sometimes slow in igniting one should make sure before leaving the room that it is burning well. The room should not be opened for from three to six hours afterwards. Sulphur injures paint, and also brass and silver ornaments, for which reason these should be removed.

(ii) Or powdered pellitory root may be substituted, but this is not so reliable an insecticide as sulphur. Exposure to its fumes may only stupefy mosquitoes; 3 lb. of powdered pellitory root would be required for a room of 1,000 cubic feet, and for the same time, namely, three to six hours.

The vessel containing the burning powder should be put standing in a safe place.

(iii) Or the hydralformant No. 1 with Shering's formalin tablets (30 tablets to be used for every 1,000 cubic ft.) supplied with directions by the Formalin Hygienic Co., Ltd., 2, Lloyd's Avenue, London, E.C.

After fumigation, the floor of the room should be swept clear of the dead and dying insects, which should be collected and burned.

(*b*) *The Avoidance of being Bitten by Mosquitoes.*

(1) These measures are the same as for anopheles. It is very important to remember that stegomyiæ bite during the daytime as well as at night.

(2) The recent outbreaks of yellow fever exemplified the importance of segregation. All that has been stated regarding this under Malaria (p. 24) applies equally to yellow fever. Segregation forms the very bedrock of disease-prevention in West Africa.

(3) Should a case of yellow fever develop, rigorous use of the patient's mosquito bed-net must be insisted upon in order to prevent stegomyiæ from biting him and becoming infective.

(4) Filariasis.

As this is another mosquito-borne malady, there is little to add concerning its prevention to what has been already written. The transmitter (*Culex fatigans*) belongs to the sub-family Culicinæ and multiplies wherever water is found, viz., in ditches, ponds, drains, tins,

water-jugs, basins, tubs, barrels, the hollow stumps of trees, &c. The mature insect is similar in habit to most of the other genera, resting in dark sheltered places during the daytime, and becoming especially active from sunset until dawn.

(5) Dysentery

Is a disease due solely to neglect. In civil life its existence is inexcusable. During warfare, however, if we consider what this really means, its ravages are hardly surprising. The extraordinary freedom from dysentery enjoyed by the Japanese during the recent war was the result of systematic precautions as to their water supply.

In West Africa all the water is dangerous, even well water obtained from a chosen source is not above suspicion, and if it were it would be certain to become more or less contaminated in the process of drawing.

A West African native town is unspeakably filthy; streamlets, which are simply cesspools set in motion during the wet season, frequently run through it carrying pollution into the rivers.

The writer has known Europeans to express surprise when told that rain-water from the tanks of their bungalows should be boiled before being used for drinking purposes, it not having occurred to them that the fæces of birds, lizards and vermin, as well as other impurities in the form of dust are, with each rainfall, washed from the roof into the tank. That excellent and ingenious arrangement invented by Dr. Strachan already referred to modifies this danger, but it would be an impossibility to totally avoid the risk of contamination.

The Source of Water Supply.

(1) Water from a well under the control of a lock and key and situated beyond reach of contamination would, of course, be chosen if opportunity arose.

(2) Next preference should be given to rain-water from storage tanks.

This matter will again be referred to under Camp Sanitation.

How to treat Water.

All water intended for domestic use should be boiled, and that reserved for drinking

purposes, either in the form of plain water, soup, tea, &c., should be filtered as well.

If the water when drawn is found to be very muddy it would be well to clear it with alum before boiling, viz., to each gallon of water add 6 gr. of alum and allow it to stand for six hours, by which time precipitation of most of the solid matter will have taken place. When treated in this manner it can be filtered more rapidly and the filter itself will require less frequent cleaning.

(1) *Boiling.*—The water should be *actually boiling for at least twenty minutes;* some micro-organisms and their spores resist boiling for some minutes.

(2) *Filtering.*—As soon as the water has cooled it should be poured into the filter; the most reliable filters are the "Berkefeld" and the "Pasteur-Chamberland" syphon filter, which are in general use in Government stations in West Africa.

Boiling is of such vast importance that the process should be personally attended to. It is the most reliable method of dealing with suspicious waters, and when thoroughly done

renders filtration unnecessary so far as actual impurities are concerned, but unfiltered water is not alone disagreeable to look at, but always contains fine particles of sand and other insoluble matter which, if ingested, would cause irritation of the stomach and intestines, and thereby predispose to the development of inflammation of the delicate membrane lining these. It should never be lost sight of that *all* water for domestic purposes should be boiled.

If the drinking water we use is rendered safe by the two measures in question, and yet that with which our plates, dishes, drinking vessels, spoons, knives and forks, &c., are washed, be the ordinary *unboiled* water, impurities in the form of micro-organisms or their eggs, or both, adhere to these utensils, and may be swallowed by us and readily cause the development of diseases we had hoped to have guarded against.

Vegetables intended to be eaten raw should be scrupulously cleansed by repeated washing in *boiled* water. Neglect of this is a frequent source of suffering.

The writer has seen serious results arise more than once from the omission of this one precaution where faithful adherence to the others was maintained. It behoves us therefore to attend with equal care to every point under consideration. To ensure safety a system such as the following should be adopted :—

(i) Just before sitting down to each meal inspect the pot of water reserved for "washing up" to make certain it is boiling or has boiled, and pay surprise visits occasionally to see that it is really used for the purpose for which it is intended, as the native servant is one of the most wily of creatures.

(ii) With the same object inspect the vessel of water reserved for filtration after dinner and see that it is kept covered and placed beside the filter, and poured into this the first thing next morning.

When and how to clean the Filter.—The frequency depends upon the condition of the water to be filtered. If it is very muddy the filter should be cleaned every second day; if not, it ought to be washed at least every

fourth day. A neglected filter has the additional danger of becoming a mosquito breeding-ground.

The cleaning process requires :—

(*a*) Personal supervision.

(*b*) A plentiful supply of *boiled* water.

(*c*) Some disinfectant.

The disinfectant is not absolutely essential but ensures a further safeguard.

(1) Draw off all the filtered water and store same in clean bottles for drinking purposes.

(2) Rinse well a basin or sitz-bath with boiled water to which some Izal or permanganate of potash crystals have been added (the latter until it is of a light purple).

(3) Into the cleansed basin or bath pour some *cooled* boiled water, with disinfectant added as before.

(4) Unscrew the filter parts and wash them in the basin by means of a clean rag or piece of lint. When dealing with the Pasteur-Chamberland make each candle should be taken from its rubber socket. These rubbers in turn should, together with all the other parts, be similarly dealt with. As the candles

are very brittle and cost about 5s. 6d. each, they must be carefully handled. Place all the washed parts aside on a clean towel.

(5) Lift the inner chamber of the filter out, empty it and wash it in like manner.

(6) Pour as much of the filtered water as you can spare from the bottles into the outer chamber of the filter, that is, into the chamber which receives the filtered water; then add a little of the disinfectant, rinse and empty out. Rinse again with filtered water to remove the odour of the disinfectant.

(7) Rinse the inner chamber, candles, rubbers, &c., a second time with *boiled* water.

(8) Return the parts into position and the filter will be ready for use.

An intelligent house steward will readily learn this mode of cleaning a filter; but he should be also taught not to place the filter parts and chambers on the ground in the open air to dry where dust and dirt would be blown upon them, thus entirely defeating the cleansing process.

The writer has frequently observed this procedure practised under the eye of the

servant's master, which is his excuse for mentioning so self-evident a precaution.

It is advisable to have two filters, they can then be alternately cleaned, and in this way shortage of filtered water can be obviated.

The common house-fly—an incessent pest in West Africa—may, in a mechanical manner, spread the disease by feeding on dysenteric stools and afterwards find its way to food and infect this by means of its unclean legs, feet and trunk.

(6) Diarrhœa.

In addition to attention to the water supply all preserved foods should be inspected before being prepared for consumption. Food of all kinds must be protected against flies, and when in the least tainted ought to be discarded.

The cook should be held responsible for the cleanliness of all cooking utensils; these ought to be washed with boiled water immediately after being used, else they will be invaded by flies. They should be inspected daily.

The house steward should be taught that dirty glass cloths are dangerous to the health of

his master. An ill-trained house-boy invariably uses filthy cloths for drying dishes, drinking utensils, spoons, forks, &c., and thereby defeats efforts against contamination of food.

(7 and 8) All other Water-borne Diseases, including Guinea-worms, Ankylostomes, and other Worms.

The prevention of these is implied in what has already been written. When stating that all water intended for domestic purposes should be boiled, bath water was included, as the parasites causing some of the most serious of water-borne ailments enter the body by boring microscopic holes in the skin. In this respect stagnant and muddy waters are particularly dangerous.

(9) Sleeping Sickness.

The transmitter of this disease is a blood-sucking insect, namely, the tsetse-fly. It is important to be able to detect this insect, therefore some of its chief characteristics and habits will be briefly referred to. The tsetse-fly, which is brownish in colour, has a somewhat

narrow body and is in size a little larger than the common house-fly. When at rest its wings are closed over each other like the blades of a scissors, and in length extend a little beyond the extreme end of the body. The proboscis projects in a straight line from the head.

If the dark lines which run along the wing be examined through a magnifying glass the fourth of these will be seen to be curved upwards in the middle of its course. (See Appendix.) The position of the wings, while the insect is at rest, and this curved wing line are very characteristic features and should render identification easy. Tsetse-flies are active during the daytime and feed about sunset, they are strong fliers and have been known to travel the distance of a mile. They are peculiarly local in their habits, *i.e.*, keeping perhaps to one side only of a river. They have a very wide distribution in Africa, but owing to travelling in this "belt" like fashion, areas quite within their reach escape them. Their rendezvous is always near water. They vigorously attack men and animals who may cross their path.

Native centres where sleeping sickness is known to exist should be avoided, as should also be the so-called tsetse-fly belts. If one is compelled to reside within, or near these, the mosquito-proof house will serve a double purpose.

(10) Plague.

The preventive measures against this disease so essentially belong to Public Health Corporations that little need be stated here concerning them. Anti-plague vaccination has been successfully practised. Evidence goes to prove that an outbreak of the disease amongst rats frequently precedes a plague epidemic.

Fleas that have fed upon infected rats, or other infected animals, transmit the disease. It can be easily understood why the disease rages in overcrowded and dirty localities. During an epidemic personal precautions consist of:—

(1) Destruction of rats, which afterwards should be cremated. The rats should not be handled.

(2) Destruction of bed bugs, fleas, &c.

(3) Abundance of fresh air and sunlight.

(4) Personal and domestic cleanliness.

(5) Washing the floors and walls of the house with solution of chloride of lime, 2 teaspoonfuls to each pint of water; or with a solution of carbolic acid, 2 tablespoonfuls to each pint of water; or Izal disinfectant fluid, 2 teaspoonfuls to each pint of water.

(11) Chiggers.

Avoidance of these consists in never walking about the house or camp in bare feet; sandals should not be worn as they provide insufficient protection, especially in camps; old slippers with partially worn out soles are equally undesirable. The warm bath should be taken daily.

The floors of the house should be swept daily, and regularly washed with soft soap and scrubbing brush, or the above mentioned solution of Izal disinfectant.

(12 Sun.

The hottest hours of the day in West Africa are from 11 a.m. until 4 p.m. From early morning until 5 p.m. a helmet should be worn out of doors.

Those whose duty compels prolonged exposure in a more or less stationary position, as for instance, the superintendence of labour works, ought to, in addition, use a sun umbrella; an excellent one made of khaki cloth and lined with red material is at present in the market and will be found the best. The helmet should completely protect the nape of the neck. The "Wolseley" pattern made of cork answers the purpose well and is most durable.

When cycling, riding on horseback, or marching, a spinal pad, lined with either red or yellow material, *must* be worn. One of the most useful garments in West Africa is the so-called "bush" shirt with spinal pad attached. Everyone going out there should include a couple in his outfit. Clothes should be of the lightest material, unlined and loosely made. Underwear made of a mixture of silk and fine wool known as "Anglo-Indian gauze" is strongly recommended. The additional cost of this will be amply repaid in comfort and durability. Woollen or merino singlets and pants, apart from being uncomfortable and predisposing towards the development of prickly heat,

shrink to a useless size when subjected to treatment by the native laundress or launderer. For ordinary everyday life pants and singlets as described, together with light porous tennis shirts, constitute suitable underwear.

The writer deprecates the ordinary waist-belt which is in general use as a substitute for braces ; it is perhaps cooler to wear than the latter, but tends to constrict and congest the abdominal organs by the more or less constant pressure exerted, and for this reason increases any predisposition towards the development of piles. Constipation is very commonly complained of by Europeans in West Africa, and must on no account be neglected, as it markedly increases the liability to the ill-effects of the sun. Alcohol of all kinds should be strictly avoided until the evening. The most refreshing beverage to one fatigued and thirsty is freshly made *weak* tea.

(13) Prickly Heat.

The cool clothing mentioned under the preceding section is the most rational means one

can adopt against this minor affection. No European escapes it; sometimes it causes a deal of discomfort. New arrivals in West Africa suffer most, simply because they develop an excessive thirst which they readily quench, and thereby encourage profuse perspiration. It is advisable, therefore, to control thirst, which is easier said than done. Woollen or flannel underwear aggravate prickly heat.

(14) Dhobie's Itch.

To guard against this very distressing ailment, attention should be paid to where, and by whom, your clothes are washed. A much more reliable plan is to have them washed on your own premises, and unless you have a well in the compound, to insist upon boiled water being used. You should also make certain that the clothes of servants or other natives are not surreptitiously washed with your own.

(15) Boils

Arise from various causes—debility, following on illness, some constitutional malady, or from some local cause.

"Malarial boils"—a term frequently used—is a misnomer and should be expunged. It implies that the development of boils is a concomitant part of the disease, malarial fever, which is not the case.

The skin of Europeans residing in West Africa is constantly moist with perspiration, which, together with the high atmospheric temperature, renders the skin-cells unusually soft, and consequently very liable to slight injuries, so small as to be invisible to the naked eye. These microscopic lesions are exposed more or less to the germs that flourish in the air, water and soil, which explains the reason why boils of local origin are the most frequent. A doctor ought to be consulted however, should boils develop, as he alone can decide what is their significance and their proper treatment.

Prevention against local infection is self-evident, viz.: wash in boiled water, a daily change of underclothing, and general personal cleanliness.

CHAPTER III.

Camp Sanitation.

This is a subject of much importance and demands special consideration, neglect of which has, before now, led to serious consequences. Much relating to it can be culled from the foregoing pages, but for the sake of clearness it will be now dealt with *in globo*. When selecting a "bush" camping-ground attention must be given to the following points:—

(*a*) The site.

(*b*) The elevation.

(*c*) Protection from mosquitoes.

(*d*) The water supply.

(*e*) The clearing of the compound.

(*f*) The treatment of the floors of the hut, &c.

(*g*) The position of servants' dwellings.

(*h*) The position of the latrine.

(*i*) The position of the "night soil" pit and its uses.

The site is dealt with in paragraph (i), p. 32.

The elevation is dealt with in paragraph (ii), p. 33.

Protection from Mosquitoes.—The three chief means at our disposal are:—

(1) Attention to the choice of a camp site, See paragraph (i), p. 32. Here, too, mention must be made of peculiar, small, boat-shaped excavations found in the large boulders and rocky outcrops common in parts of Northern and Southern Nigeria. They are used by the natives for various purposes, including the sharpening of knives and cutlasses. During the wet season they form ready breeding-places for mosquitoes, and therefore, when in the vicinity of a camp, should be well filled with gravel.

(2) Attention to the mosquito bed-net. See paragraph (3), p. 21. In addition it would be an advantage to have the canopy of the net made of calico, in order to protect the bed and the occupant from the dust and small insects falling from the grass roof.

(3) Attention to the rational use of mosquito boots. See paragraph (4), p. 23.

An ingenious, reliable, and most comfortable portable mosquito-proof-room, specially introduced for camp use, has been designed by Sydney Smith, Esq., late District Engineer, Government Railway, Southern Nigeria. The writer has had the privilege of seeing it in use many times and can strongly recommend it for those who contemplate camp life. By dispensing with the outer cover it can be utilized in a house or bungalow as a perfect substitute for the mosquito-proof-room. It can be had from the Gourock Ropework Co., Ltd., Port Glasgow, Scotland.

The Water Supply.—A well should be sunk within the compound whenever possible. Before doing so, the ground should be examined for some distance around to ensure that no cesspool, drain, or other source of impurity is in the neighbourhood. A coping of stones or laterite 3 ft. high ought to surround the mouth of the well, which must also be kept covered under lock and key, except while water is being drawn, and a U-shaped drain should be dug around the surface. A well, however, is scarcely feasible

unless the camp is to be occupied for some time, or other sources of water supply are absent.

As a rule, the water is obtained from an adjacent river. Should this run close to a neighbouring town, a part of the river, some distance from, and at a higher level than, the town, should be selected.

When a camp is occupied by more than two Europeans it is often impossible to provide for each a bath consisting only of water which has been previously boiled. Under such circumstances all one can hope for is a sufficient supply of boiling water, which, when added to ordinary water, will enable each to take a warm bath. A safe rule under these circumstances is to use some purifier—such as Izal, of which pour about 3 or 4 teaspoonfuls into the bath and mix well with the water (the accurate proportion, one teaspoonful to every 2 pints of water, need hardly be adhered to). If nothing better is at hand crystals of permanganate of potash may be substituted. If the water comes from a well dug within the compound the risk of course is considerably modified.

The Clearing of the Compound.—(See paragraph (2), p. 20, and paragraph (iv), p. 34.) In addition attention must also be paid to the disposal of empty tins, broken bottles, and other rubbish which cannot be burned. Such things should be collected daily and deposited in a pit dug at the border of the compound; each day's collection should be completely covered with clay. Such a pit should be made in dry, porous ground, and situated far away from the source of the water supply. It should not be more than 3 ft. deep or else it will become swamped during the rains; when filled with rubbish it must be very securely covered and surmounted by a well-made mound to allow for sinkage.

A universal custom amongst West African natives in felling trees, irrespective of the size, is to leave the stumps standing 2 or 3 ft. high. These are frequently hollow in the centre, the stumps of palm trees are always so. During rain these cavities become filled with water in which mosquitoes readily lay eggs. Soon they become alive with larvæ; so numerous indeed that ants stationed on the

edge of the holes can easily prey on them, and have been seen doing so by the writer. It is very essential, therefore, to have all hollow stumps filled in with fine gravel well beaten down. This is the easiest way of dealing with them, and is a reliable measure. Should the rounded, thick stumps of palm trees be simply dug up and laid aside, no good whatever is gained; they will still form receptacles for water. If they are dealt with in this fashion they must be also split up and burned.

Though mentioned under the heading of Camp Sanitation, this is a point specially applicable to the clearing necessary for railway or road making.

The Treatment of the Floors of the Hut, &c. —An earthen floor if well made should be hard and without cracks. Trouble and discomfort will be avoided by personal attention to the making of the floor in the building of a barri. It should be well beaten and then allowed to dry; cracks are sure to form during the drying, these should be filled in and the beating renewed; the process should be re-

peated several times, that is, until the floor is hard, firm, and without cracks.

The floors should be sprinkled once a day with a solution of Izal and water, and afterwards well swept. When kept hard and clean chiggers are not nearly so liable to be present, and ants will also be discouraged.

A very common custom in camp is to have the legs of tables and meat safes resting in tins filled with water; the object being to prevent ants from creeping up and attacking food. The idea is an excellent one so far as defeating the ants is concerned, but it is frequently overlooked that each tin of water forms an ideal mosquito breeding-place. If instead you use a watery solution of poison, your own dog or your neighbour's will some day, when heated, drink this and probably die. One of two things, therefore, should be done, either the water must be renewed every day—an impossible task for the lackadaisical servant—or substitute pure Izal or tar.

The Position of Servants' Quarters.—This point has been dealt with in paragraph (v), p. 34.

The Position of the Latrine.—Particulars

will be found in paragraph (vi), p. 35. In addition, it must be leeward of, and far away from the well, should one exist. It should be protected by a grass roof, and grass or mud walls.

The Position of the "Night Soil" Pit, and its Uses.—A "night soil" pit should be dug in dry porous soil and situated leeward of the dwellings, at least 300 yds. distant from the nearest of these. Above all it must not be in the vicinity of the water supply, be that a well or river. It should be 3 ft. wide, 6 or more ft. long, and 1½ ft. deep.

Fixed beside the pit there ought to be a vessel holding water for the purpose of washing the pail. This vessel should on no account be carried to the source of water supply to be filled, and, further, it should be emptied regularly every day, or else it will become a breeding-place for mosquitoes.

A scoop or shovel should be always beside the pit for the purpose of covering deposits with dry earth or sand. Now this pit should serve the double purpose of receiving the contents of the pail from the Europeans' latrine,

and be itself a latrine for the use of servants and other natives employed within the compound.

A "latrine boy" should be engaged whose duty ought to be confined to carrying the pail to the "night soil" pit at least once a day, there depositing the contents, washing the pail, and finally, covering over the excreta with dry earth or sand, keeping the surroundings clean, and report when a new "night soil" pit is required.

All natives engaged within the compound should be instructed to use the "night soil" pit as a latrine, and to utilize the dry earth or sand in the manner specified during each visit.

Disobedience of this order should be very severely dealt with, as promiscuous deposition of fæces is the rule with natives. "Night soil" pits when full should be well covered with clay and capped with a ridge $1\frac{1}{2}$ ft. high; neglect of this will result in the area becoming objectionable during the rainy season, when sinking is certain to occur.

CHAPTER IV.

Dietary, Bath, Exercise and Treatment.

Dietary.

Tropical dietary is always a difficult problem ; unfortunately it is especially so in West Africa. Too often one has to be satisfied with what he can get. In some parts tinned foods form the staple supply. To lay down then a hard-and-fast *regimen* would be waste of time and reveal palpable ignorance of existing conditions. Here our remarks will be confined to making a list of the articles at our disposal, and how best to utilize them.

Milk.—In parts of Northern Nigeria rich fresh milk can be easily procured, and is, perhaps naturally, eagerly sought after as a relief from the tinned substitute, especially by those who like porridge at the breakfast meal. The writer has known almost fatal results to ensue in consequence, although the milk had been boiled by the native cook. In temperate

climates there is no food more liable to harbour the organisms of disease than milk; this liability is obviously enormously increased in the Tropics. Even milk which has been sterilized by boiling if exposed to the air becomes tainted, and very rapidly so, in the Tropics. One of the best brands of preserved milk is the "Sledge" brand Condensed milk, which can be procured from the local stores —preference should be given to the small sized tins, as when opened the contents can be quickly used. If when a tin is opened the contents are found to be of uneven consistency, *i.e.*, partly watery and partly curdled, they should be discarded.

Tinned Food. — All tinned food must be consumed almost immediately after being opened to guard against ptomaine poisoning. Salted foods, such as tongue, corned beef, or bacon, will remain eatable for twenty-four hours if locked in an ice-chest.

Fruit.—The best preserved fruits are pears, apricots and figs. Raspberries and strawberries should be eschewed.

Fruit is one of the most important food

constituents in the Tropics. In West Africa choice must usually lie between the banana, plantain, and paw-paw. In some places one can obtain lime-fruit, the juice of which when mixed with sugar and aerated water makes a most refreshing beverage. The pine-apple is a poor specimen, unless cultivated in one's own garden.

Europeans stationed in or near coast towns can obtain a greater variety, where oranges are usually plentiful; these are also to be had in some inland towns such as Kumasi. In addition, mango fruit and avocado pears are obtainable in Sierra Leone. Paw-paw is the best of all; it materially aids digestion. When ripe its fruit is of a deep orange colour, and has an uncommon and delicious flavour if eaten raw. Unripe paw-paw when boiled answers as an excellent substitute for vegetable.

"Stuffed paw-paw" when served by a West African *chef de cuisine* is one of the most palatable dishes. Bananas when eaten uncooked sometimes cause dyspepsia; this is due to the delicate fibrous layer which clings to the fruit while the outer skin is being removed.

It is quite indigestible and should be scraped off with a spoon or blunt knife.

Vegetables. — Yam, sweet potato, native spinach, garden egg, pumpkin, palm cabbage, tomatoes, onions. One or more of these can be found in most native markets. The tomatoes are unworthy of the name, being only the size of gooseberries.

The following will grow well from English seeds :—

Lettuce, watercress, tomatoes, radishes, leeks and cucumbers. The cultivation of these in one's garden will amply repay the trouble. Fresh vegetables should be liberally consumed.

Fish.—In coast towns fresh fish can be daily purchased in the market. Inland it is seldom to be had unless in the neighbourhood of a large river, where the pastime of fishing will be found profitable.

Fowl.—Chickens are the white man's mainstay in West Africa. Yet in some places they cannot be secured without paying a price altogether out of proportion to their value. In parts of the Gold Coast this is very evident ; however in Sierra Leone, Lagos, and Northern and Southern Nigeria, better conditions prevail.

Wildfowl.—Pigeons, both green and grey, are found generally throughout West Africa. In many parts of Sierra Leone and Northern and Southern Nigeria partridges are plentiful. In Sierra Leone and Northern Nigeria guinea-fowl are found in fair numbers in some districts, though absent from others. On the Gold Coast and in Ashantee, though game exist, the dense forest extending inland for over 150 miles renders the sport of fowling almost impossible. Pigeons are practically all one can reach. West African partridges are quite as good as those found at home, but they are frequently spoiled in the cooking.

Owing to the toughness of West African beef the average cook invariably gives this a preliminary boiling, even though it may be finally served as a "grilled steak" or a "roast sirloin." As he applies the term "beef" to animal food in general from a pigeon to a perch, he deems it necessary to subject all to the same process of softening. The result is that though the birds always reach table seemingly roasted to a turn, they are as devoid of flavour as a potato skin. It is very necessary therefore to

impress upon your cook that "beef" in the form of wildfowl is not to receive the initial boiling. He will require to be reminded of this many times before he can be relied upon to do what is right.

Wild guinea-fowl are probably the most delicious table birds in the world, if properly cooked, and are well worth seeking. They are heavy fliers and more easily killed than partridge, which if only "winged" will probably escape you through the long grass or undergrowth. Before leaving this subject it may be mentioned that wildfowl should be eviscerated as early as possible, and not hung for more than half a day in the Tropics, *i.e.*, if killed in the afternoon they should be cooked for lunch next day at latest.

Decomposition is prone to set in quickly, particularly in the wounded parts, and if the bird is kept too long it may, though having an epicurean flavour, set up severe intestinal inflammation a few hours after being eaten.

Antelope are plentiful in West Africa generally, especially in Sierra Leone, and venison *is* often exposed for sale in the market places.

Beef, Mutton and Goat's Flesh.—These are all easily obtainable in coast towns and large inland centres. In outlying stations, however, the supply may be very scanty. Mutton is preferable to beef, as the latter is tougher and has less flavour. Goat's flesh is the least desirable of the three, but is an improvement on tinned food, which is less nutritious and much more costly. Eggs as a rule can be purchased at all market places; they are not however always fresh.

The foregoing will convey an idea of the food resources at one's disposal. The supply varies considerably according to the district or colony. In one place all may be within reach; in another, only chickens; in another not even these. However, generally speaking, chickens, are obtainable, and form the most suitable animal food in the country, being light and easily digested. One seldom grows tired of chickens owing to the variety of ways in which a good cook can serve them. The well-known "ground-nut stew" is really excellent.

In West Africa a well-trained steward and a reliable cook are essential health assets.

It is important to examine the market messenger's purchases. Whenever he buys beef, mutton, or goat's flesh this ought to be inspected ; should it present a pale, washed out, soddened appearance, it must be rejected.

Alcohol.

A teetotaler need not alter his ways while sojourning in West Africa, neither is it necessary for a temperate drinker to become an abstainer. Unrestricted consumption of alcohol is certain, however, to have a rapidly deleterious effect. A man who allows himself a too liberal supply should not be surprised if he falls a prey to diseases in their most virulent form.

In a tropical climate owing to the free and continuous perspiration a much larger amount of liquor can be consumed without interfering with the mental faculties, than in the cooler latitudes, and the moderate drinker may be insidiously led to exceed his limit. The habit of "nipping" as a result of the great heat and constant thirst becomes a fascination. Alcohol ought to be avoided during the daytime, or at most a little red or white wine diluted with

Apollinaris water may be taken with lunch. Those who have outdoor employment must eschew liquor *in toto* until evening time. Refreshing beverages are effervescing lime drinks, milk with Apollinaris or other aerated water, cold, weak, unsweetened tea without milk. Half a wineglassful of good whisky, diluted with effervescing water taken after the evening bath, and repeated after dinner will be found beneficial. The popular "cocktail" is one of the commonest causes of dyspepsia.

The Bath.

A cold bath ought never to be taken in West Africa, where the tonic effect associated with the "morning tub" in temperate zones is entirely wanting.

The enervation, more or less common to all European residents, is really benefited by the invigorating influence of a warm bath, which should be habitually taken, when the day's work is over.

The experienced coaster when feeling unusually fatigued after the day's work, or if caught in a tornado, gets back to his quarters

as quickly as he can, and without delay has a warm bath; he puts on a complete change of clothing and takes an additional 5 gr. of quinine with a little whisky and water.

Exercise.

Outdoor exercise in moderation is an essential health-giving factor. Those whose occupation is indoor should especially note this, and each afternoon enjoy cycling, horse riding, or walking for a couple of hours. When stationed at some centre, games such as golf, tennis, croquet, or cricket, may be substituted. After exercise there is nothing more pleasant than to sit down to cool and quench thirst. Yet in the whole gamut of precautions there is none more sonorous than the note of warning against this practice, which, countless times, has been the exciting cause of some latent malady more or less serious.

Arrangements ought to be made to have the warm bath ready, which should be taken as soon as possible after recreation has finished, followed by a complete change of clothing, and then "*otium cum dignitate.*"

Treatment.

The original intention was not to touch upon this subject, as treatment of disease by "domestic doctoring" is one of the most dangerous forms of quackery and cannot be too strongly deprecated.

Whenever an European feels "out of sorts" in West Africa, he should retire to bed and send for his medical attendant. Fortunately nowadays few Europeans find themselves beyond the call of an officer of the West African Medical Staff. For those who happen to be so isolated, or who are some days' journey distant from a doctor, the following brief directions are intended. To attempt fighting an illness on one's feet may result in the gravest consequences.

When a chilly sensation develops associated with muscular pains, and perhaps headache and nausea, the sufferer should retire to bed immediately and *sip* a cup of *very weak tea* as hot as can be borne, or, what is better, a hot lime drink (he can repeat this as often as he desires). He should also take 10 gr. of quinine every six or eight hours until he has

had 30 gr. in the twenty-four hours, as probably his disease is *malarial fever*. Should headache be very severe 10 gr. of phenacetin may be taken, and if necessary repeated in two hours, but not further. The patient will very likely sweat freely and must not be allowed to lie in damp clothes. Dry blankets and dry pyjamas ought to be in readiness, and should be made use of as soon as the sweating stage is over. Before putting on the dry suit the body should be well rubbed with a towel. He will be the better of a brisk purgative such as 5 gr. calomel (quinine and calomel are well known medicines on the coast). He must not attempt to walk to the latrine, but instead should have the pail, when required, brought into his room. If thirsty he can drink freely of milk and soda water or of plain cold water. If his stomach rejects medicine just after it has been swallowed, it should be repeated immediately after the vomiting has ceased. His food should consist of fluid nourishment in the form of Lemco, Oxo, Brand's essence, Horlick's malted milk, or Benger's food, any of which can be easily prepared.

Travellers would do well to always carry a supply of these. Should vomiting be troublesome, sips of champagne—as cold as possible—will be found beneficial, as will also pellets of ice sucked, or if there are any "Tabloids" or tablets of bismuth in the house, take as many of these as will make 20 gr., break them up into a powder, throw this on his tongue and get him to wash it down with some water. While vomiting continues, food should be taken in very small quantities at a time—and about every two hours—Lemco and malted milk as hot as can be borne; Brand's essence iced, if possible. Should he feel weak he can have a wineglassful of champagne occasionally or a little brandy or whisky diluted with soda water. If a medical thermometer be at hand the sufferer's temperature should be taken in the armpit each morning and evening, and recorded for the information of the doctor, until whose arrival the quinine should be continued. If no doctor be within reach, the quinine treatment ought to be maintained as specified until the temperature has fallen to the normal point, or, in the absence of a

thermometer, until the patient feels definitely better. After the improvement has continued for three or four days, he can get up for a while each day, and partake of solid food, and if all goes well resume light duty a few days later.

For ten days after he has become free from fever he should take 10 gr. of quinine daily, either in a single dose or 5 gr. morning and evening. At the end of this time he must resume the usual dose of 5 gr.

Blackwater fever is a disease easily recognized, its chief characteristic, as suggested by the name, being the altered colour of the urine, which when passed is found to be either red like blood or as dark as porter.

When a case occurs there must be no effort spared to secure medical aid. Meanwhile, the patient must be kept as quiet as possible, and on no account is he to be allowed out of bed. Should he be stationed in an outlying district, anxiety may prompt friends to save time by having him conveyed by hammock or rail to the nearest doctor. Such a procedure may be fraught with grave danger in tending to in-

crease the prostration which is so marked a feature of this disease, and ought not to be undertaken except under medical sanction and supervision.

When he desires to pass water he must be assisted to do so, while lying down, into some suitable utensil; if his bowels are about to move the most convenient vessel available must be passed beneath him.

He must be carefully shielded from draughts. If vomiting occurs take a couple of table-spoonfuls of mustard, make this into a thick paste with some water and spread it upon a piece of brown paper the size of your hand (that is from the wrist to the finger-tips). Cover the poultice with a piece of thin muslin or a very thin handkerchief and place it over the stomach with the muslin next the skin. To locate the stomach, draw a straight line down from the nipple to just below the ribs, on the left side of the body. Apply the poultice immediately below the ribs, in such a position that if the straight line were continued it would pass through the centre of the poultice. Remove the poultice after ten

minutes, dry the skin and cover it with a soft, clean handkerchief or a piece of cotton wool. Repeat the poultice in two or three hours if necessary; should the mustard cause smarting smear on the part some cold cream, olive oil, or such-like substance. Should vomiting persist, try a little champagne, iced if possible. Bismuth may also be given in the manner already mentioned. If there is any bicarbonate of soda (bread soda) at hand let him take as much as will fit on a shilling every couple of hours, dissolved in half a wineglassful of cold water. Should the skin be hot and dry, encourage him to partake liberally of hot lime drinks, or of *very weak*, hot, unsweetened tea.

If a medical thermometer is at hand take his temperature in the armpit, morning, mid-day, and evening, and keep the record for the doctor. Should the thermometer at any time register 105° F., the patient ought to have "tepid sponging," or if in the absence of a thermometer the fever seems to be on the increase, sponging may be resorted to. Tepid sponging must be carefully done to avoid the risk of a chill. Let it be performed slowly, gently, regularly, and without fuss.

Procure a basin of lukewarm water, a sponge, a towel, and a waterproof sheet, or a piece of American cloth, or a large bath towel as a substitute; place all on a table beside the patient's bed. Then remove one arm out of the pyjama sleeve, keeping the rest of the body covered. Take the sponge out of the water, squeeze it and sponge this arm (having placed the large towel or waterproof sheet under it to avoid wetting the bedclothes), from shoulder to finger-tips, including the arm-pit, with the lukewarm water, then dry the limb gently. Do likewise with the other arm; with both arms now out of the sleeves, the pyjama jacket can be easily slipped off the body; next bare the chest, which sponge, dry, and re-cover; next the abdomen; then turn the patient very gently on one side and sponge and dry the back. Now put on the pyjama jacket, and replace patient on his back. If he is very weak do not on any account allow him to sit up during the operation. Now remove his pants and treat each leg in turn likewise, meanwhile keeping the rest of the body covered. Remember a good-sized towel or

waterproof sheet must be used throughout to protect the bed from the water. This sponging may be repeated several times, especially if the patient feels refreshed by it.

If loin pain is complained of, or if the patient is not passing much water, apply a hot stupe to the loins. To make a hot stupe, take a large bath towel, and 1 yd. of flannel (tearing up a flannel shirt for the purpose if necessary), double up the flannel, place it in the centre of the bath towel, which should be resting on the basin, pour boiling water on the flannel until it is soaked, then catch the ends of the towel and twist them in opposite directions, thereby squeezing the flannel thoroughly ; now remove the flannel and apply it across the loins, covering it with some waterproof material. Renew the stupe every half hour or so until relief is found ; finally dry the part and cover it with a layer of cotton wool or a piece of soft woollen material.

A rubber hot-water bottle would of course be more convenient, but will hardly be within reach. The stupe or bottle should be as hot as can be borne ; test the heat of either by

applying your elbow to it, which will be a safe indicator. The flannel stupe should be very thoroughly squeezed before being applied.

If calomel is in the house let him swallow a 5-gr. "Tabloid" or tablet. He can be allowed to drink freely of cold water.

Nourishment.

Benger's food, malted milk, "Butterfly" brand or "Sledge" brand milk, mixed with soda water, Brand's essence, Lemco, arrowroot, these he may have according to taste every two hours, 2 or 3 teaspoonfuls of Brand's essence, or half a teacupful of the others, made in the usual manner, at a time.

To make arrowroot take 2 teaspoonfuls and blend with 1 tablespoonful of cold water, then add half a pint of boiling water, stirring well all the time, sweeten to taste. Condensed milk diluted with boiling water may be substituted for the boiling water, but arrowroot made of water is more digestible.

Vomiting is so very frequently a distressing symptom that food has to be cautiously given. If vomiting does occur very small

quantities of nourishment must be administered at a time, such as half a teaspoonful of Brand's essence, or chicken tea may be tried. It is so much more palatable than any of the preserved foods, and it is made thus :—

Take the breast and wings of a fowl, strip off all the flesh, throwing away the skin and bones, chop up the flesh and put it into a small, clean saucepan, add just sufficient cold water to cover it, simmer very gently for half an hour, add salt to taste, and give half a teaspoonful or more at a time according to the condition of the patient's stomach. If vomiting is very severe give nothing in the form of food while it continues, beyond small quantities of egg water, which consists of the *whites* only of four raw eggs beaten into a foam and mixed with 1 pint of cold water to which is added the juice of one fresh lime. Should the patient feel faint at any time he may have small quantities of champagne or brandy or whisky diluted. Have a kettle of hot *filtered* water and some ordinary table salt near at hand by the time the doctor arrives, as he may require both of these at once.

Diarrhœa.

A sufferer from this complaint should rest in bed, keeping his abdomen well covered, and when required have the pail brought into his room. Food and drink ought to be taken cold, or lukewarm, not hot. Should he feel weak, he may have a little champagne or brandy and water or whisky and water. If there is chlorodyne at hand he can have 10 drops of this mixed with half a wineglassful of water every three hours while symptoms continue, or instead a lead and opium tabloid. (Note particularly he is to have only one of these medicines.)

Snake-bite

Is very seldom met with amongst Europeans in West Africa. When the bite is situated on the leg (below the knee) or on the arm (below the elbow), immediately tie a piece of rope or a pocket handkerchief or whatever else is at hand above the knee or elbow as the case may be ; pass a stick underneath the band and twist it tightly. Next, without delay, make several *small* cuts through the bite well into

the flesh in a radiating fashion and rub crystals of permanganate of potash into these.

Get the patient into bed and give him 1 wineglassful of undiluted brandy ; repeat this in half an hour, or sooner, if the patient becomes prostrate. Loosen the bandage for two seconds every fifteen minutes, otherwise maintain the pressure for an hour. If permanganate of potash crystals are not within reach put a little gunpowder into the cuts and ignite it.

Dhobie's Itch.

The following remedy is a reliable one for this complaint, and those about to proceed to the Tropics will be saved inconvenience by bringing it out with them. The prescription can be compounded by a qualified pharmaceutical chemist.

Hydrarg. perchlor.	...	...	gr.iv.
Acid. salicyl.	...	...	gr.xl.
Spt. vini rect.	...	...	℥iv.

Fiat applicat.
Sig. Poison : for ext. use only.

To be applied with a camel's hair-brush to the affected parts, especially over the edges,

twice or thrice daily and gradually discontinued as subsidence of the disease takes place.

Prickly Heat.

The best remedy for relieving the intense irritation this causes is the "Sulphaqua Bath Charge" made up in packets by the S.P. Charges Coy., St. Helens, Lancashire, England, and obtainable from any chemist, with directions.

A supply specially packed for use in the Tropics should be included in one's outfit.

A soda bath as a substitute may be tried, viz., bread soda about 10 oz. to about 30 gallons of water.

APPENDIX.

These sketches reveal approximately the natural sizes of the insects.

No. 1.—Female anopheles mosquito.

No. 2.—Female culex mosquito.

No. 3*a*.—Shed larval skin.

No. 3*b*.—Pupa (of either species) after shedding larval skin.

No. 4.—Larva of culex.

No. 5.—Larva of anopheles.

No. 6.—Tsetse-fly, showing the characteristic folding and veining of the wings.

No. 7.—Stegomyia mosquito.

The pupa and larvæ are represented in the position when seen resting beneath the surface of water. When larvæ are disturbed they move in a rapid wriggling fashion, and descend to the bottom of the vessel they may be in, where they remain for a short period before ascending to resume their former position.

Larva of stegomyia resembles that of culex.

Mention of entomological distinctions would be out of place here.



1



2



3a



3b



4



5



6



7

MISCELLANEOUS NOTES.

These "Notes" are to assist those who require information concerning some of the sundry items comprising a Tropical outfit.

The traveller is recommended to go to some firm who, owing to their experience, have acquired a practical knowledge of the actual requirements of travellers in every circumstance.

Special "Tabloid" Medicine Chests and Cases are issued by Burroughs Wellcome and Co.

For general use one of the handiest cases is "Tabloid" Medicine Chest No. 231.

Especially adapted for station, farm or camp, "Tabloid" Medicine Case No. 258 (the Settler's) contains, in addition to medical supplies, a supply of "Tabloid" compressed bandages and dressings.

"Tabloid" Medicine Chest No. 250 is that which was carried through Darkest Africa by the late Sir H. M. Stanley, and is the standard equipment for large expeditions and out-stations at a distance from supplies.

Messrs. Parke, Davis and Co. have had much experience in fitting up medical outfits for every climate, and of sizes varying from the pocket-case for the tourist to the comprehensive equipment for a camel-corps.

Anyone contemplating a visit to or residence in West Africa might apply to Parke, Davis and Co. for information.

The most soluble Salt of Quinine is the bihydrochlorate. This and all other Salts of Quinine are prepared in the highest state of purity by Howards and Sons, Ltd., Stratford and Ilford, London, both in bulk and in tablet form.

Euquinine may be substituted for quinine, and is preferred by some, owing to the absence of the characteristic taste of quinine itself.

It is supplied in the form of tablets by Messrs. Widenmann, Boicher and Co., Ltd., London.

It is stated that Euquinine does not cause "Quininism."

Horlick's Malted Milk has the advantage of being easily prepared, is therefore largely used in the sick room, and will keep indefinitely in any climate. It is prepared with the greatest ease by the mere addition of water. Its ready portability, combined with the latter feature, makes it of especial value in Tropical districts.

Benger's Food during the process of preparation is predigested, which greatly aids its assimilation. The directions on the tin imply that fresh milk is essential; this is not so, as the writer has many times successfully prepared it for patients in the heart of the West African forest by adding *diluted* condensed milk as a substitute. When properly

cooked it should have the consistency of cream and not that of blancmange. It is frequently made too thick for delicate stomachs. There is no difficulty whatever in the cooking if the directions are followed, bearing in mind that perfectly fresh and sound milk must be used, or in default diluted condensed milk.

The Berkefeld Travellers' Pump Filter is a most useful filter for travellers, being so compact that it can be carried in one's baggage. It filters water very rapidly, and thus becomes a boon to those on the march when longing for a cup of tea.

For equipment in tents for travellers where the individual may have constantly or even occasionally to shift, Messrs. Benjamin Edgington, 2, Duke Street, London Bridge, have a variety on view.

Special mention may be made of the mosquito-umbrella tent.

The use of tinned and other preserved foods at times becomes a necessity; obviously great care should be exercised in selecting the best brands.

Messrs. Griffiths, McAlister and Co., Liverpool, are well-known exporters of these.

The mawkish taste of boiled water is overcome by the use of *Sparklets*, by means of which also any (cold) liquid may be aerated.

For hot countries there is made a felt-covered syphon, in which the water is cooled by wetting the felt and hanging the syphon in a draught.

A large supply of Sparklets can be easily carried. The makers, Messrs. Aerators, Ltd., supply an interesting booklet.

Mosquito boots should have the uppers reaching to the knee, as mosquitoes are disposed to attack the ankles and legs. They are supplied by all Tropical outfitters. A specially recommended kind with high uppers is on the market, and manufactured by Mr. George Norris, 82, Bishopsgate, London, E.C.

Mild aperient waters, such as *Apenta*, will be found most beneficial when their use is indicated. It will be found convenient to have them always at hand. *Apenta* has been given by some the preference in West Africa, having proved itself free from unpleasant after-effects.

For Tents and Camp Equipment and Colonial Outfit, Messrs. John Edgington and Co., Ltd., of Sardinia House, Kingsway, W.C., have a high reputation. Their experience in the trade enables them to give expert advice on requirements needed for all the Colonies. Being actual manufacturers, they are able to offer both advantageous prices and terms to intending buyers. At their extensive showrooms all articles can be inspected and approved, a desirable detail from a buyer's point of view. It may be mentioned that this Company fitted out the late Captain Scott with all his Tents and Camp Equipment for his last Antarctic Expedition.

In "Ashore or Afloat" Messrs. John Langdon and Sons, of Duke Street, Liverpool, give an amount of information with regard to Equipment which for anyone going abroad will be of much interest and value. They supply complete Tropical outfits. We understand the British Cotton-growing Association and Liverpool School of Tropical Medicine buy from this firm and have expressed satisfaction with their goods.

———

Whatever may be the view of the reader on the subject alcohol in its proper place has always had its *rôle*. In its use, however, the first thing to ensure is purity. Of the various forms in which alcohol is recommended the most favoured to-day is Whisky, of which the choice lies between Irish and Scotch. Messrs. John Jameson claim absolute purity for their whisky, and while this is borne out by the certificate of the analyst it also seems to be endorsed by the *Lancet*.

———

Those who prefer a light wine as a substitute for the stronger alcoholic beverages should note that even this ought to be well diluted with aerated water.

The red wine known as "Vibrona" is stated to have the additional advantage of containing valuable tonic properties.

———

The "Alpha Brand" Malvern Water claims to be the purest of all natural table waters.

It is supplied by Messrs. Burrow, of Malvern, in close-fitting glass-stoppered bottles, and is sent all over the world.

As a really useful disinfectant *Izal* has been found most effectual. It is of special advantage in latrine or closet. It is manufactured by Newton, Chambers and Co., of Thorncliffe, near Sheffield, and can be recommended for its efficiency.

———

The *Oxidized Phosphor Bronze Wire Netting*, specially made by Messrs. G. Christie, Ltd., Glasgow, for the building of mosquito-proof houses and ships, has recently been proved by experiment to be especially durable.

———

Lemco is an ideal sustenant for invalids, since it is free from fatty matter, and consists of pure Beef Extractives in a readily assimilable form.

Half a teaspoonful of Lemco dissolved in hot water will make a delicious cupful of strong beef-tea. A little pepper and salt should be added to suit the taste, as Lemco contains no seasoning.

It fully retains its properties for any time in a Tropical climate.

———

Clothing for Tropical wear should be of the very lightest material. The ordinary flannel tennis shirts and such like markedly predispose towards the development of "Prickly Heat" and ought to be discarded.

The Cellular Clothing Company, Ltd., Fore Street, E.C., supply suitable substitutes under the title "Aertex," and invite special attention to their non-actinic *red* garments.

JOHN BALE, SONS & DANIELSSON, LTD., LONDON, W.

WELLCOME LIBRARY INSTITUTE

Vibrona

THE

Ideal Tonic Wine.

Recommended by the Highest Medical Authorities.

VIBRONA has been justly described as the SUPREME TONIC, and the best evidence of its unique properties is to be found in the fact that the world-wide reputation which VIBRONA enjoys is mainly due to the spontaneous personal testimony of those who having experienced its remarkable energising powers are glad to recommend it to their friends.

In depressed conditions of the system, arising from overwork, worry or sleeplessness; in convalescence from severe illness such as INFLUENZA, PNEUMONIA, or TYPHOID; in recovery from surgical operations, or to conserve the forces during any critical period, the restorative power of VIBRONA cannot be over-estimated.

In NEURALGIA and INSOMNIA it is no exaggeration to say that VIBRONA acts like a charm, obstinate cases which have withstood every other form of treatment being frequently completely cured after two or three Liqueur-glasses of VIBRONA have been taken at frequent intervals.

Persons residing in, or visiting localities where Malarial Fever exists, should make it a rule to take at least one Liqueur-glass of VIBRONA every day. This will not only materially increase the power to resist infection, but, in the event of an attack, will greatly mitigate its severity and hasten convalescence.

VIBRONA—THE IDEAL TONIC WINE—is supplied in bottles containing 40 liqueur-glasses by all leading Chemists, Wine Merchants, and Stores throughout the world. Price in Great Britain 3/9.

BY APPOINTMENT

TO



HIS MAJESTY

THE

KING OF SPAIN.

SOLE PROPRIETORS

FLETCHER, FLETCHER & Co., Ld., LONDON and SYDNEY.

Face end matter.

BANK OF BRITISH WEST AFRICA, Ltd.

Established 1894.

Head Office: **17 & 18, Leadenhall Street, LONDON, E.C.**

Telegraphic and Cable Address: "*ARREGLO, LONDON.*"

Liverpool Office: 14, Castle Street. Hamburg Office: Ness 1.
New York Agency: 64, Wall Street.

Subscribed Capital, £1,000,000. Called-up Capital £400,000.
Reserve, £176,750.

Directors:

The Rt. Hon. Viscount Milner, G.C.B., G.C.M.G. Henry Coke, Esq.
C. B. Edgar, Esq., D.L., J.P. D. Q. Henriques, Esq.
George Miller, Esq. W. F. Moore, Esq. Geo. W. Neville, Esq.
Sir Owen Philipps, K.C.M.G. Mazzini Stuart, Esq., J.P.
O. Harrison Williams, Esq.

Chief Manager: Leslie Couper. *Secretary*: J. R. Bingham.

Bankers:

Bank of England. London Joint Stock Bank, Ltd. Parr's Bank, Ltd.

Branches: Las Palmas, Bathurst, Freetown, Sherbro, Monrovia, Grand Bassam, Assinie, Axim, Seccondee, Saltpond, Cape Coast Castle, Winnebah, Accra, Tarquah, Coomassie, Lagos, Ibadan, Abeokuta, Forcados, Warri, Onitsha, Lokoja, Calabar, Zungeru, Zaria.

Current and Deposit Accounts accepted at all Branches. Salaries and Dividends collected, Securities accepted for safe custody. Stocks and Shares bought and sold. Payments effected in any part of the world, and every facility afforded to customers resident in West Africa and elsewhere.

Sulphaqua

BATH AND TOILET CHARGES

will be found most effective in the treatment of

"Dhobbie's Itch," Craw-Craw, Prickly Heat, &c.

Highly recommended by "The Journal of Tropical Medicine," &c.

Full particulars on receipt of card addressed to—

THE S. P. CHARGES Co., ST. HELENS, ENGLAND.

BOOKS

MEDICINE.
SURGERY.

On all subjects, including Nursing, Hygienic, First Aid, Physical Culture, &c., and for every Examination. Foreign Books in every language and on all subjects.

SECOND-HAND AT HALF PRICES.

NEW, at 25 Per Cent. Discount. Cat. No. 850 Post Free. State Wants. Books Bought.
Books sent on approval. Music supplied, NEW and SECOND HAND.

W. & G. FOYLE, 121-123, CHARING CROSS ROAD, LONDON, W.C.

Telegrams—"Foylibra, London."

CHRISTIE'S

Oxydized Phosphor Bronze

MOSQUITO GAUZE

Is the most durable and satisfactory on the market. It outlasts many renewals of the usual cheaper qualities.

A recent testimonial reads:—

"I tested various wire cloths and cloths made of various metals and the Oxydized Phosphor Bronze, manufactured by George Christie, Ltd., was the only one which satisfactorily came through all the tests, and as a matter of fact subsequent experience justified the conclusions come to by these tests. Except that the bloom has gone off the wire the material is as good as the day it was put in, and there is every likelihood of it lasting some considerable time longer. This therefore is the only wire cloth I can recommend."

Full particulars, Samples and Prices from the sole makers :—

GEORGE CHRISTIE, Ltd.,

Ladywell Wire Works,

GOVAN, GLASGOW.

BENJAMIN EDGINGTON'S
TENTS AND CAMP EQUIPMENT.



Double-Roof Ridge Tent,

The Best for AFRICA.

As Supplied to H.M. Government for East, West and Central Africa, and to the Principal Travellers and Missionaries.

Complete Camp Equipment. Mosquito Nets and Netting of finest Government quality.

Air and Water-tight Trunks.
Clothing and Personal Outfit.

WRITE FOR CATALOGUES OR CALL AND INSPECT.

S. W. Silver & Co., and Benjamin Edgington, Ltd.,

DUKE STREET, LONDON BRIDGE, S.E.
AND
KING WILLIAM HOUSE, 2, EASTCHEAP, E.C.

PROVISIONS & OUTFIT.

GRIFFITHS, McALISTER & CO.,

Export Provision Merchants, &c.,

29-31, Manesty's Lane, LIVERPOOL.
14, Billiter Street, LONDON, E.C.

Suppliers of all kinds of Provisions, Camp Equipment, Medical Stores, Wines, Spirits, and Mineral Waters, &c., for Exploring and Mining Expeditions; also for private use abroad.

All Goods suitably packed for Hot or Cold Climates and made up in loads suitable for all modes of Transport.

CONTRACTORS TO THE CROWN AGENTS FOR THE COLONIES.

Telegraphic Addresses { "COOMASSIE," LIVERPOOL. "APPEASABLE," LONDON.

Codes used—A B C, 4th and 5th Editions, and Lieber's.

ESTABLISHED 1880.

Suppliers to Sir Ernest Shackleton's Antarctic Expedition, 1907-1909; *Captain Scott Expedition*, 1910, *and Dr. Mawson's Expedition*, 1911.



STILL.

WATER.

Where your drinking supply is at all doubtful ALWAYS be on the safe side and drink

BURROW'S "Alpha Brand" MALVERN WATER.

THE GREAT PROTECTION

against disease from drinking hard or impure water.

THE PUREST AND SOFTEST OF ALL DRINKING WATERS.

Chemically and Bacteriologically Pure—See D. Thresh's Report.

AGENTS WANTED.

W. & J. BURROW, The Springs, Malvern

By Appointment to H.M. THE KING.